

96-347768/35

A85 L03

ROHL 94.11.30

ROHM CO LTD

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94.11.30 94JP-297649 (96.06.21) H01L 33/00, G09F 9/33
*JP 08162672-A

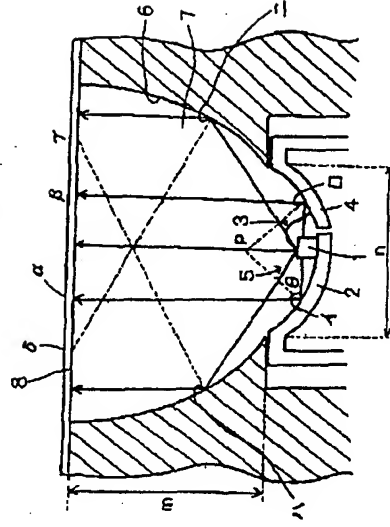
Light emitting display device - is provided with LED on deep portion of curved part of metal frame
C96-110028

The device consists of desired shape lead frames (2,4). A light emitting diode (1) is installed on the deep portion of the curved part of metal frame (5). A reflecting surface (6) is formed in agreement with the curved area of the metal and surrounds the LED. The light rays from the diode project horizontally due to the reflecting surface. A segment display surface (9) collects the horizontally projected light. Thus, the distribution of luminosity over the display surface becomes uniform.

ADVANTAGE

Does not require restriction for shape of segment surface. Realises legible display of uniform luminosity.

A(12-E11A) L(4-E3A)



(5pp3028DwgNo.1/6)

JP 08162672-A

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-162672

(43)Date of publication of application : 21.06.1996

(51)Int.Cl.

H01L 33/00
G09F 9/33

(21)Application number : 06-297649

(71)Applicant : ROHM CO LTD

(22)Date of filing : 30.11.1994

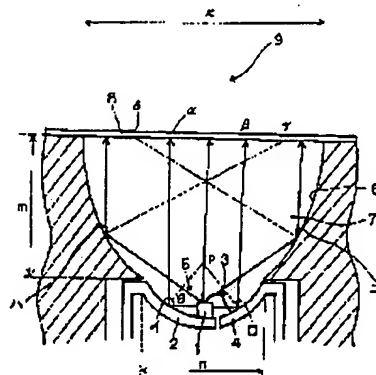
(72)Inventor : MANO YASUHISA

(54) LIGHT EMITTING DISPLAY DEVICE

(57)Abstract:

PURPOSE: To efficiently gather a light emitted substantially horizontally from the side of a light emitting diode to the periphery of the center of a segment display surface and to make the distribution of brightness at the display surface uniform by bending the metal frame for placing the diode in a recess state, and forming a reflecting surface.

CONSTITUTION: A metal frame 5 is bent at the opposed ends of lead frames 2, 4 in recess state having a bent surface. A light emitting diode 1 is mounted at the frame 5 and the bent site in the recess of the frame 5, and so enclosed that the diode 1 is opposed to the center via a reflecting surface 6 bent in the front surface shape. Thus, the light emitted from the side of the diode 1 substantially in the direction is emitted obliquely upward at the peripheries α , β the center of the display surface 9, the light emitted upward in the vicinities α , β of the end is emitted upward, and dispersed to the substantially center and converged, and hence the irregularity of the brightness at the display surface can be suppressed.



LEGAL STATUS

[Date of request for examination] 01.06.1995

[Date of sending the examiner's decision of rejection] 08.10.1997

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3033883

[Date of registration] 18.02.2000

[Number of appeal against examiner's decision of rejection] 09-19000

[Date of requesting appeal against examiner's decision of rejection] 07.11.1997

[Date of extinction of right]

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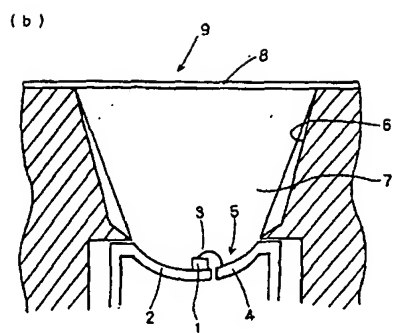
CLAIMS

[Claim(s)]

[Claim 1] Luminescence display characterized by being attached in the luminescence display which has a leadframe, the light emitting device attached in this leadframe, and the reflector which surrounds this light emitting device on the curved surface which the aforementioned light emitting device bent in the shape of [in the aforementioned leadframe] a hollow.

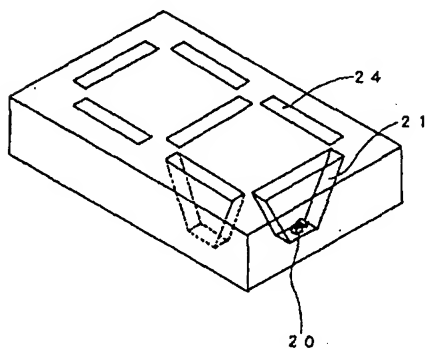
[Claim 2] Luminescence display given in the 1st term of a patent claim characterized by being the segmental die to which the amount of [of the aforementioned luminescence display] display makes the shape of an abbreviation rectangle.

[Translation done.]

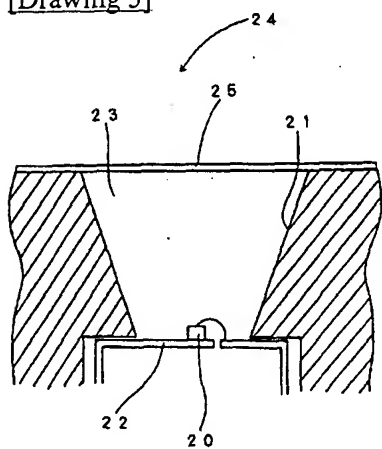


[Drawing 4]

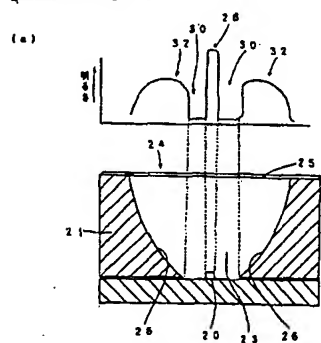
7セグメント型発光ダイオード表示装置の構造 (透視図)



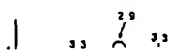
[Drawing 5]

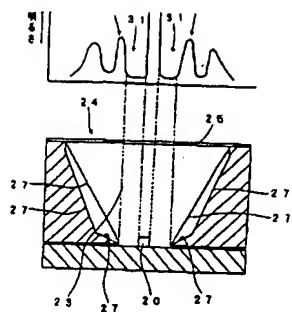


[Drawing 6]



(b)





[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to luminescence display. The luminosity in display, such as a character of seven segments or 16 segments, is related with the LED display which can improve further in more detail.

[0002]

[Description of the Prior Art] In recent years, light emitting diode is surrounded by the reflector, a segment (picture element) is constituted, and the LED display of the segmental die which displays several characters, a character, a figure, or a sign combining this segment has come to be manufactured. 16 segmental dies (lot thing which prepared the shape of a U.S. character in the interior of the shape of a character) which can display 7 segmental dies which can display an English character, katakana, etc. are shown in this LED display. Drawing 4 is the partial perspective drawing showing the segment array and structure of 7 segmental-die LED display, light emitting diode 20 is surrounded by the reflector 21, and ***** which constitutes the segment of a common knowledge digital pattern is formed in the front face of the case which consists of opaque plastics. In order that it may be a cross section meeting the longitudinal direction of the segment to which the segment screen 24 of the aforementioned LED display makes the shape of an abbreviation rectangle, light emitting diode 20 may be attached in the center section of the leadframe 22 in which flattening of the shape of an abbreviation rectangle corresponding to the aforementioned segment screen 24 was carried out and drawing 5 may make the luminosity of a segment uniform, in the interior 23 of a segment, the resin seal is carried out by the translucency resin which consists of an epoxy resin which mixed the dispersion agent (not shown). Moreover, the aforementioned reflector 21 is inclined and formed in the longitudinal direction of the aforementioned leadframe 22 so that the light emitted from the aforementioned light emitting diode 20 may reflect in the direction of the segment screen 24 through the interior 23 of a segment. And in order to make uniform the luminosity of the front face of the aforementioned segment screen 24, the optical diffusion sheets 25, such as a resin film with which the emulsified translucent resin film or the optical dispersing agent is mixed, are stuck or laid.

[0003]

[Problem(s) to be Solved by the Invention] Drawing 6 (a) and (b) are the cross section of the segment longitudinal direction which shows the structure of the segment center section of the segmental-die LED display which added the further improvement to the above-mentioned segmental-die LED display, and explanatory drawing showing the distribution of the luminosity in the segment screen. In order are efficient much more and to reflect the light emitted from light emitting diode 20 in the direction of the segment screen 24, it devised constituting a reflector 21 with curved-surface processing or two or more slant faces etc. However, the luminosity of the aforementioned segment screen 24 having un-arranged [which produces the variation in the distribution of light and darkness in the segment screen 24 as shown in drawing 6 (a) and (b)] in spite of such improvement by the light emitted to the upper part of the aforementioned light emitting diode 20, and the light which was emitted to the method of an ascendent, was reflected by the curved surface 26 or two or more slant faces 27 of a reflector, and was collected near the edge of the segment screen 24. Namely, the light emitted to an abbreviation horizontal from the side of

the aforementioned light emitting diode 20 does not reach the aforementioned segment screen 24. It is not efficiently employed in an effective display, or two or more slant faces are hit repeatedly, it is absorbed, and a bright display cannot be performed. the segment screen 24 the core -- setting - the peaks 28 and 29 of a bright section, and the circumference near the core -- setting -- dark space 30 and 31 -- further -- the circumference -- bright sections 32 and 33 was made and there was a fault which becomes bright at the longitudinal direction of the segment screen 24, or becomes dark, and becomes an uneven display Then, this invention was made in view of the above-mentioned trouble, makes uniform the distribution of the luminosity in the screen of luminescence display, and aims at offering much more legible luminescence display.

[0004]

[Means for Solving the Problem] It is characterized by attaching this invention in the luminescence display which has a leadframe, the light emitting device attached in this leadframe, and the reflector which surrounds this light emitting device, and displays a number, a character, a sign, etc. on the curved surface which the aforementioned light emitting device bent in the shape of [in the aforementioned leadframe] a hollow in order to also harness the light emitted to an abbreviation horizontal from the side of light emitting devices, such as light emitting diode, in the effective display of the segment screen. Moreover, it is characterized by this invention being a segmental die to which the amount of [of the aforementioned luminescence display] display makes the shape of an abbreviation rectangle.

[0005]

[Example] Drawing 1 is the cross section showing the internal structure of the segmental-die LED display concerning this invention. As shown in drawing, light emitting diode 1 directly the inferior-surface-of-tongue electrode, and is attached, and the upper surface electrode is connected to the leadframe 4 of another side which counters aforementioned one leadframe 2 by wire BONTINGU with the wire 3. [near the edge on one leadframe 2 of the metal frame 5 which consists of the leadframes 2 and 4 of the couple which counters] Curved-surface processing of the aforementioned metal frame 5 is carried out, respectively so that it may become the shape of a hollow in which the edge side where the leadframes 2 and 4 counter has a curved surface. The aforementioned light emitting diode 1 attached in the part bent in the shape of [of the aforementioned metal frame 5 and this metal frame 5] a hollow is surrounded as the aforementioned light emitting diode 1 faces a transverse-plane configuration a center section by the reflector 6 by which curved-surface processing was carried out. the wall surface of the reflective frame of a resin Plastic solid with which the aforementioned reflector 6 constitutes the segment of a segmental-die LED display -- using -- the longitudinal direction side-attachment-wall-side of the long hole-like segment screen 9 -- a curved surface and a crosswise side-attachment-wall side -- abbreviation -- it is formed as a perpendicular flat surface And it fills up with the resins 7, such as an epoxy resin or silicone resin, in the aforementioned reflector 6. It emanates to the display front face of a resin 7 outside through the optical translucent diffusion sheet 8 stuck or laid, reflecting irregularly the light which the light dispersing agent with the aforementioned transparent resin 7 which usually consists of an impalpable powder although it carries out [are and] and is translucent is mixed, and is emitted from the aforementioned light emitting diode 1 on the shape of a hollow by the aforementioned metal frame 5 and the aforementioned reflector 6 by which curved-surface processing was carried out. The curved surface of the aforementioned metal frame 5 by which curved-surface processing was carried out is prepared in the shape of a hollow with the curvature which the light emitted from the side of the aforementioned light emitting diode 1 at an abbreviation horizontal reflects by reflector I of this metal frame 5, and RO, and arrives at the periphery of Circumferences alpha and beta of the core of the aforementioned segment screen 9 which is each right above section. That is, the curved surface of this metal frame 5 is formed so that the center of the radii of the aforementioned metal frame 5 may set on the intersection P of the straight line which divides into two equally each angle of reflection theta formed by reflector I, RO, and light emitting diode 1 of the aforementioned metal frame corresponding to alpha of the aforementioned segment screen, beta, and this, and the straight line extended from the aforementioned light emitting diode 1 to right above. Although the light emitted to an abbreviation

horizontal from the side of the aforementioned light emitting diode 1 is brought together in per [of the core of the screen 9 of the aforementioned segment / Circumferences alpha and beta], direct light collects alpha and beta and condition is influenced by this, especially central approach is desirable by the length of 1/8 of the width of face kappa of the core of the screen 9 of a segment to a segment, or 1/4. moreover, the radii to which the aforementioned reflector 6 by which curved-surface processing was carried out sets Centers gamma and delta to the inside of the optical diffusion sheet 8 near the edge of the screen 9 of the aforementioned segment -- a basis -- ***** , reflector HA, and NI are prepared That is, the radius of curvature of a reflector 6 is sharply set up for a long time rather than the radius of curvature of the aforementioned metal frame 5, and curved-surface processing of the reflector 6 is carried out. Thereby, the light emitted to the method of an ascendent of the aforementioned light emitting diode 1 is brought together in per [of the reflector near the edge of the screen 9 of a segment / Centers gamma and delta]. Reflector HA of this reflector 6 and especially the centers gamma and delta of NI have desirable edge approach by the length of 1/8 of the core of the screen 9 of a segment to the segment width of face kappa, or 1/4. Moreover, the light emitted to up to the aforementioned light emitting diode 1 irradiates the abbreviation center section of the screen 9 of the aforementioned segment regardless of the aforementioned metal frame 5 and the aforementioned reflector 6. Drawing 2 is explanatory drawing showing the distribution of the luminosity in the segment screen by the segmental-die LED display concerning this invention. The light emitted from the aforementioned light emitting diode 1 is collected on the average, without concentrating on a piece place in the aforementioned segment screen 9 as shown in this drawing 2 . namely, the abbreviation from the side of light emitting diode -- abbreviation which the distribution of the luminosity of the segment screen 9 forms the shape of an abbreviation dome, and does not have variation since the light by which a bright section 12 is emitted to the light by which a bright section 11 is emitted to the light emitted horizontally to the method of an ascendent of light emitting diode to the upper part of light emitting diode distributes, respectively and produces a bright section 10 on the segment screen 9 -- a uniform legible display is securable As an example in drawing 1 , one side uses the red light emitting diode of GaP of 0.3mm around for light emitting diode 1. That whose thickness m of a ABS system white resin cast is 5.6mm as a reflector 6 is used. When thickness 0.2 or a 0.6mm resin thin film is used for the shape of a hollow as an optical diffusion sheet using that whose opening width of face n of the metal frame 5 by which curved-surface processing was carried out is 2.0mm, The distribution of a uniform luminosity was able to be obtained to the whole screen 9 of a segment by the radius 8 when drawing 1.0 or 1.3mm, curved-surface HA of a reflector 6, and NI for the radius when drawing curved-surface I of the metal frame 5, and RO by the length 7.0 of the screen 9 of a segment, or 11mm, or 10mm. the above-mentioned example -- the abbreviation from the side of light emitting diode -- although it is the example which carried out curved-surface processing of the reflector in order to reflect the light emitted horizontally in the direction of the segment screen, the conventional technology passes, and even if use the thing of a flat-surface configuration as a reflector or it uses what consisted of two or more slant faces by having, there is no change in that there is an effect which can improve the luminosity in the circumference of the core of the segment screen Drawing 3 (a) and drawing 3 (b) are the cross-section schematic diagrams showing the internal structure of the segmental-die LED display of other examples concerning this invention in this case. Moreover, the segmental-die LED display concerning this invention cannot be overemphasized by that the display of 7 segmental dies, 16 segmental dies, or the segmental die beyond it is applicable regardless of the number and array of a segment. In addition, although the above explained the example of a segmental-die LED display, if this invention has at all not only this but the reflector which surrounds further the light emitting device attached in the leadframe, it is applicable also about the so-called ramp-type LED display.

[0006]

[Function and Effect of the Invention] Since curved-surface processing of the metal frame which lays light emitting diode is carried out at the shape of an abbreviation hollow, it is reflected with a metal frame, and the light emitted to an abbreviation horizontal from the side of light emitting diode is also collected around the core of the segment screen efficiently, and is harnessed in the

effective display of the segment screen. Consequently, the light emitted to an abbreviation horizontal from the side of light emitting diode, the light emitted to the method of an ascendent, and the light emitted upwards set to the segment screen. Since it is collected on the average, without concentrating on a piece place so that it may distribute, respectively and a bright section may be produced, the variation in a periphery and the luminosity further applied to an edge is suppressed from the core of the segment screen, and the legible display of the luminosity of abbreviation homogeneity can be realized to the whole segment screen. In addition, since this invention can harness the light which does not ask the configuration of the screen but is emitted to an abbreviation horizontal from the side of light emitting diode in the effective display of the screen when it has the structure which lays a light emitting device in a leadframe and is surrounded by the reflector, it is widely applicable to the general luminescence display not only using the segmental-die LED display which made the screen the shape of an abbreviation rectangle but a light emitting device.

[Translation done.]